KSZ8864
Evaluation Board User's Guide

KSZ8864 Integrated 4-port 10/100 Ethernet Managed Switch

Rev 1.1 May 2014

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Revision History

Revision	Date	Change
1.0	10/21/10	Initial release
1.1	05/09/14	Update pictures, add RJ49 and RJ50 for rev1.2 eval board

1.0 Introduction

The KSZ8864 is Micrel Operations' new generation integrated 4-port switch with a 64-pin small package. The KSZ8864 device consists of two PHYs and four MACs. Two of MACs support either MII or RMII interfaces for dual processor/DSP data transfer. Higher speed SPI and MDC/MDIO interfaces can fully manage the 4-port switch by the processor. The device had been designed with cost sensitive systems in mind but still offers a multitude of features such as switch management; port and tag based VLAN; 1/2/4-queue QoS priority; a dual MII/RMII option data interfaces and CPU control interfaces of SPI, MDC/MDIO with MIIM/SMI. MIIM is the standard IEEE 802.3 MII Management Interface. SMI is non-standard Serial Management Interface that can access all registers by the Management Data Input/output MDIO interface. The KSZ8864 is an excellent choice in current complex Ethernet applications with single processor or dual processors, industrial automatic, automotive, etc. fields and as a standalone 4-port switch.

The KSZ8864 evaluation board is designed to allow the user to experience first-hand the rich feature set of these existing 4-port switches of KSZ8864CNX/RMNUB. The evaluation board is highly configurable and easy to use.

2.0 Features

- Micrel KSZ8864 Integrated 4-port 10/100 Managed Ethernet Switch
- 2 RJ-45 Jacks for Ethernet LAN with Corresponding Isolation Magnetics.
- Auto MDI/MDIX on all Ports.
- 1 PHY mode and 1 MAC mode 40-pin male/female connectors are for the port 3 Switch SW3-MII/RMII Interfaces.
- 1 PHY mode and 1 MAC mode 40-pin male/female connectors are for the port 4 Switch SW4-MII/RMII Interfaces.
- 1 USB Port Interface Configurable to emulate interfaces of EEPROM, SPI interface, MDC/MDIO with SMI Interface and access all MIIM registers.
- On Board EEPROM
- 2 LEDs Per Port to Indicate the Status and Activity
- 5VDC, 2.5A Universal Power Supply

3.0 Evaluation Kit Contents

The KSZ8864 Evaluation kit includes the following:

- KSZ8864 Evaluation Board Rev. 1.x
- KSZ8864 Evaluation Board User's Guide Rev 1.x
- Micrel EEPROM/SPI/SMI/MIIM Configuration Software
- KSZ8864 Evaluation Board Schematics and BOM
- The software, schematics and other design information will be found in the hardware design package in the Design Kit of the KSZ8864 Ethernet switch product on Micrel website. (Contact your Micrel FAE for the latest schematic).
- The USB cable is not included.

4.0 Hardware Description

The KSZ8864 evaluation board is in a compact form factor and can sit on a bench near a computer/laptop. There are three options for configuration: strap in mode; EEPROM mode; and SPI mode. Strap in mode configuration is easily done with on board jumper options. EEPROM mode and SPI mode are accomplished through a built in USB port interface. Using Micrel EEPROM software and your PC, you can reprogram the EEPROM on board by the USB port. Or using Micrel SPI software and your PC, you can access the KSZ8864's full feature set registers by the USB to SPI interface. The board also features the MII connectors for the Switch MII/RMII interface on port 3 and port 4. These are to facilitate connections from the switch to an external MAC or PHY with MII/RMII interface.

The KSZ8864 evaluation board is easy to use. There are programmable LED indicators for link and activity on all ports and a power LED. A manual reset button allows the user to reset the board without removing the power plug. A standard 5VDC power supply is included so that the user can supply power from any 110-240 Volt AC wall or bench socket, and the power also can be provided by USB port when close pin 2-3 of the JP47 jumper.

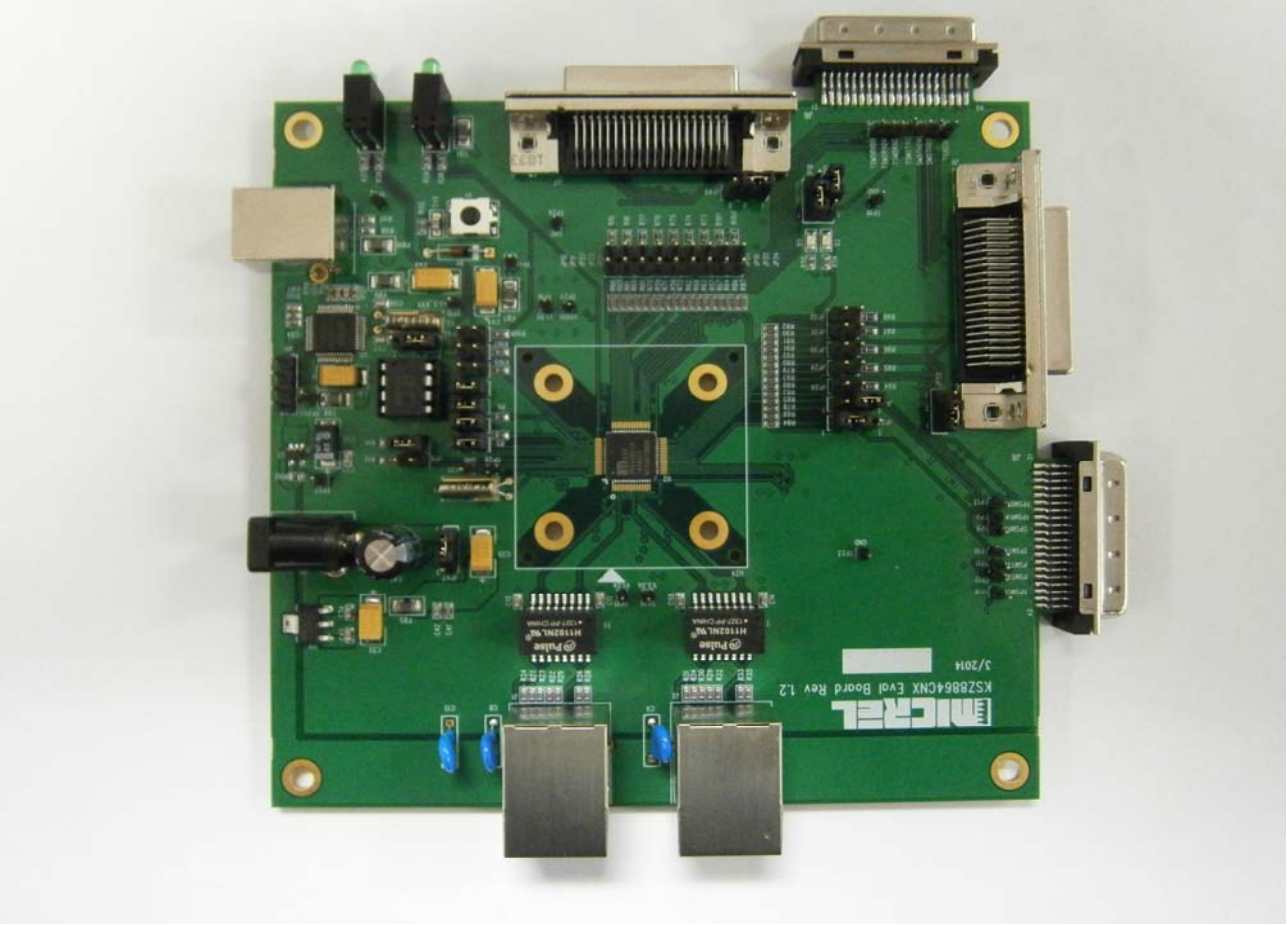


Figure 1 KSZ8864 Evaluation Board

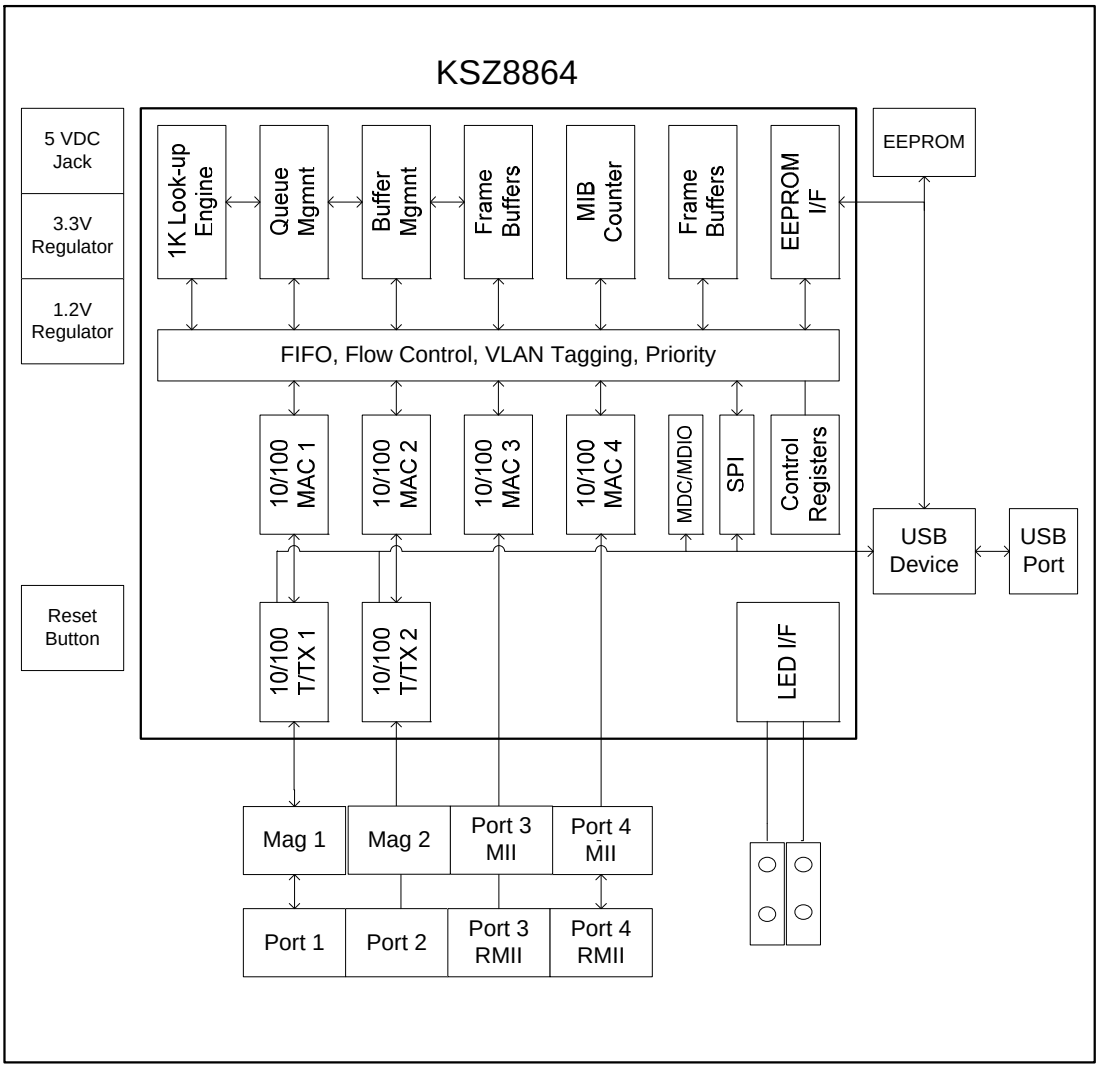


Figure 2 KSZ8864 Evaluation Board Block Diagram

4.1 Strap in Mode

Strap in configuration mode is the quickest and easiest way to get started. In this mode, the KSZ8864 acts as a standalone unmanaged 4-port switch. The user has to simply set the board's configuration jumpers to the desired settings and apply power to the board. The user can also change jumper settings while power is applied to the board and press the convenient manual reset button for the new settings to take effect. Note that even if there is no external strap in values are set, internal pull up and pull down resistors will set the KSZ8864 default configuration. Section 4.1.1 covers each jumper on the board and describes its function.

To start in strap in configuration mode, make sure that JP1 and JP2 are closed and JP3, JP4, JP8 and JP9 are open. In this mode, pins (PS1,PS0)=(0,0), the chip will start automatically, after trying to

read the external EEPROM, if EEPROM does not exist, the chip will use the default values and the strap option setting for all internal registers.

4.1.1 Feature Setting Jumpers

The evaluation board provides jumpers to allow the user to easily set strap in configurations for the KSZ8864. Table 1 describes the jumpers and their function in the open or closed state.

Table 1 Feature Setting Jumpers

Jumper	KSZ8864 Signal	2-pin Jumper Open 3-pin Jumper 1-2 Close	2-pin Jumper Closed 3-pin Jumper 2-3 Close
JP1	SCL	SPI and MIIM/SMI	EEPROM
JP2	SPIQ	SPI	EEPROM and MIIM/SMI
JP3	MDC	SPI and EEPROM	MIIM/SMI
JP4	MDIO	SPI and EEPROM	MIIM/SMI
JP8	PS0	EEPROM/SPI/SMI Setting. See Section 4.2 and 4.3	
JP9	PS1	EEPROM/SPI/SMI Setting. See Section 4.2 and 4.3	
JP48	Testing	Power of EEPROM comes from VDDIO	Power of EEPROM comes from 3.3V only (default)
JP10	SCONF0	MII Setting See Section 4.6	
JP11	SCONF1	MII Setting See Section 4.6	
JP17 3-pin	Default is 2-3 close for port 4 SW4- MII	1-2 Close: SW4-RMII provides 50MHz clock	2-3 Close: SW4-MII or SW4-RMII receive 50MHz clock from opposite
JP18 3-pin	Default is 1-2 close for port 4 SW4- MII	1-2 Close: SW4-MII mode. Detail see schematics	2-3 Close: SW4-RMII interface without clock provided
JP20	SM4RXD3	Disable SW4-MII/RMII Flow Control	Enable SW4- MII/RMII Flow Control
JP21	SM4RXD2	SW4-MII/RMII Half Duplex Mode	SW4-MII/RMII Full Duplex Mode
JP22	SM4RXD1	SW4-MII/RMII 100BT mode	SW4-MII/RMII 10BT mode
JP23	SMRXD0	LED Mode 0: PxLED1 = Link/Act PxLED0 = Speed	LED Mode 1: PxLED1 = 100Link/Act PxLED0 = Full Duplex
JP24 3-pin	Default is 2-3 close for pot 3 SW3- MII	1-2 Close: SW3-RMII provides 50MHz clock	2-3 Close: SW3-MII mode or SW3-RMII receive 50MHz clock from opposite
JP27 3-pin	Default is 1-2 close for port 3 SW3- MII	1-2 Close: SW3-MII mode. Detail see schematics	2-3 Close: SW3-RMII interface without clock provided
JP29	SM3RXD3	Enable device flow control	Disable device flow control

JP30	SM3RXD2	Disable Back Pressure	Enable Back Pressure
JP31	SM3RXD1	Drop excessive collision packets	Do not drop excessive collision packets
JP32	SM3RXD0	Aggressive back off disable	Aggressive back off enable
JP39	P1LED0	SW4-MII mode	SW4-RMII mode
JP41	P1LED1	Device is clock mode when use RMII interface	Device is normal mode when use RMII interface
JP42	P2LED0	SW3-MII mode	SW3-RMII mode
JP47 3-pin	Default is 1-2 close for DC from 5V Jack	1-2 Close: 5V DC is from the power jack of AC adapter	2-3 Close: 5V DC is from the USB connector.
JP49 3-pin	Default is 1-2 close for 3.3V	1-2 Close: Provide 3.3V to port 4 connector for external single PHY eval board	2-3 Close: Provide 5V to port 4 connector for external single PHY eval board
JP50 3-pin	Default is 1-2 close for 3.3V	1-2 Close: Provide 3.3V to port 3 connector for external single PHY eval board	2-3 Close: Provide 5V to port 3 connector for external single PHY eval board

Table 2 Reserved Jumpers

Jumper Number	Description	Recommended Settings
JP19	SM4RXDV	Open
JP28	SM3RXDV	Open
JP34	SM3CRS	Open
JP35	SM3COL	Open

4.2 EEPROM Mode

The evaluation board has an EEPROM to allow the user to explore more extensive capabilities of the KSZ8864. The user can conveniently program the EEPROM on board using the USB port from any computer with a WIN 2000/XP environment and the Micrel provided software. This makes it easy for the user to evaluate features like "broadcast storm protection" and "rate control".

To prepare the KSZ8864 evaluation board for EEPROM configuration follow these steps:

1. Copy the Micrel provided EEPROM software to your computer.
2. Set JP3, JP4, JP5 and JP9 as specified in Table 3 for EEPROM mode configuration. Make sure that the EEPROM is installed on the board.

Table 3 EEPROM Mode Settings

Jumper	Description	Setting
JP1	EEPROM	Closed
JP2	EEPROM	Closed
JP3	MDC	Open

JP4	MDIO	Open
JP8	Serial Bus Config. (PS0)	Open
JP9	Serial Bus Config. (PS1)	Open

3. Connect the computer's USB port to the KSZ8864 board with a USB port cable.
4. There are two way to power up the evaluation board:
   a). Connect the 5 VDC power supply to the KSZ8864 when JP47 pin1-2 is closed.
   b). 5 VDC power source from the USB port when JP47 pin 2-3 is closed.
5. The KSZ8864 will power up in its default configuration if there is no information in the EEPROM.
6. Program the desired settings into the EEPROM using the Micrel software. See the software description section 5.6 for details.
7. Press the manual reset button. The KSZ8864 will reset and read the new configuration in the EEPROM. After reset, the KSZ8864 is ready for normal operation.

4.3 SPI Mode

From SPI interface to the KSZ8864, use a USB to SPI converter that allows accessing all of the KSZ8864 features and registers. The user can easily access the SPI interface using a computer connected to the evaluation board's USB port interface. Micrel provides a Windows 2000/XP based program for the user to evaluate the KSZ8864's full feature set. In addition to all the control registers available via EEPROM programming, a host CPU connected to the KSZ8864's SPI interface will be able to access all static MAC table, the VLAN table, dynamic MAC address table and the MIB counters.

To prepare the KSZ8864 evaluation board for SPI mode configuration follow these steps:
1. Copy the Micrel provided SPI interface software on your computer.
2. Set JP3, JP4, JP5 and JP9 as specified in Table 4 for SPI mode configuration.

Table 4 SPI Mode Settings

Jumper	Description	Setting
JP1	EEPROM	Open
JP2	EEPROM	Open
JP3	MDC	Open
JP4	MDIO	Open
JP8	Serial Bus Config. (PS0)	Open
JP9	Serial Bus Config. (PS1)	Closed

3. Connect the computer's USB port to the KSZ8864 board with a USB port cable.
4. Remove the EEPROM from the evaluation board. (Optional)
5. There are two ways to power up the evaluation board:
   a). Connect the 5 VDC power supply to the KSZ8864 when JP47 pin1-2 is closed.
   b). 5 VDC power source from the USB port when JP47 pin 2-3 is closed.
6. The KSZ8864 will power up initial default configuration with the start switch in register 1 bit 0 = '0' which means the switch is "off". You can set the bit 0 ='1' to start switch.

7. Open the Windows and navigate to the directory where the Window SPI file is stored. Click its icon to invoke the software.
8. Program the desired settings using the Micrel SPI interface software. See the software operation description section 5.7 for details.

4.4 10/100 Ethernet Ports

There are two 10/100 Ethernet ports on the KSZ8864 evaluation board. The ports J1 and J2 can be connected to a traffic generator/analyzer or a SmartBit via standard RJ45 connectors using CAT-5 cables. Each port can be used as either an uplink or downlink. All ports support auto MDI/MDIX so there is no need for cross over cables.

J1 = RJ45 connector for port 1
J2 = RJ45 connector for port 2

4.5 LED indicators

Ethernet Port LEDs

There are two columns of LED indicators, one column for each of the two ports. The LED indicators are programmable to two different modes. You can program the LED mode through a strap in option on JP23 or in register 11, bit 1. The mode definitions are shown in Table 5. There are three LEDs per port. The naming convention is "LEDx_y", where "x" is the port number, and "y" is the number of the LED for that port.

Table 5 LED Modes

Mode 0	Mode1
PxLED1 = Link/Act	PxLED1 = 100Link/Act
PxLED0 = Speed	PxLED0 = Full Duplex

P1LEDy are assigned to Port1

P2LEDy are assigned to Port2

Power LED

The board also has a power LED D3 for the 3.3V power supply. D3 LED indicates 3.3V Power on and off.

Interrupt LED

The board also has an Interrupt LED D2 for the Link status change when set the interrupt mask register 125. D2 LED turns on to indicate the interrupt to be asserted.

4.6 MII/RMII Port Configuration

There are two MII/RMII ports on the KSZ8864. One port connects to the port 4 MAC4 in the KSZ8864, and we refer to it as the port 4 Switch SW4-MII/RMII port. The second MII/RMII port

connects to the port 3 MAC3 in the KSZ8864, and we refer to this as the port 3 Switch SW3-MII/RMII port. Both the SW4-MII and the SW3-MII are default available as PHY modes. SW4-MII can be configured to MAC mode by setting pin [47, 48] =11 and SW3-MII can be configured to MAC mode by setting bit 6 = '1' in the register 223. Both MAC4 and MAC3 also can be configured to RMII interfaces mode for SW4-RMII and SW3-RMII by the strap pins P1LED0 and P2LED0, P1LED0 is pulled down (JP39 closed) for SW4-RMII mode, P2LED0 is pulled down (JP42 closed) for SW3-RMII mode.

The Switch MII port can be set to PHY mode, MAC mode. In PHY mode of the SW4-MII, the Switch MII port will transmit and receive signals on J6 of the board's male MII connector. This mode is usually used to connect the KSZ8864 to a CPU. In MAC mode of the SW4-MII, the Switch MII port will transmit and receive signals on J7 of the board's female MII connector. This interface is normally used to connect the KSZ8864 to an external PHY. In PHY mode of the SW3-MII, the Switch MII port will transmit and receive signals on J8 of the board's male MII connector. This mode is usually used to connect the KSZ8864 to an external MAC. In MAC mode of the SW3-MII, the Switch MII port will transmit and receive signals on J9 of the board's female MII connector. This interface is normally used to connect the KSZ8864 to an external PHY.

Table 6 SCONF [1:0] pin [47, 48] for SW4-MII PHY/MAC mode

JP11 Pin 47	JP10 Pin 48	Switch SW4-MII
Open	Open	SW4-MII PHY mode (Default)
Open	Close	Disabled
Close	Open	Disabled
Closed	Close	SW4-MII MAC mode

4.6.1 Port 4 SW4-MII Jumper Configuration

Modes	JP10	JP11	JP39	JP17	JP18
SW4-MII MAC Mode with J7 used	Close	Close	Open (default for SW4-MII)	Pin 2-3 Close	Pin 1-2 Close
SW4-MII PHY Mode with J6 used	Open (default for PHY mode)	Open (default for PHY mode)	Open (default for SW4-MII)	Pin 2-3 Close	Pin 1-2 Close

Table 7 Configure for SW4-MII

4.6.2 Port 3 SW3-MII Jumper and Register Configuration

Modes	JP42	Reg 223 Bit6	JP24	JP27
SW3-MII MAC Mode with J9 used	Open (default for SW3-MII)	1	Pin 2-3 Close	Pin 1-2 Close
SW3-MII PHY Mode with J8 used	Open (default for SW3-MII)	0 (default for PHY mode)	Pin 2-3 Close	Pin 1-2 Close

Table 8 Configure for SW3-MII

4.6.3 Port 4 SW4-RMII Jumper Configuration for KSZ8864

Modes	JP39	JP41	JP17	JP18
SW4-RMII MAC to MAC mode with J6 used	Closed	Open is clock mode (Device's clock source comes from X1 pin 25MHz and SM4RXC pin provide 50MHz clock to both RMII)	Pin 1-2 Close	Pin 1-2-3 Open
SW4-RMII MAC to PHY mode with J7 used	Closed	Open is clock mode (Device's clock source comes from X1 pin 25MHz and SM4RXC pin provide 50MHz clock to both RMII)	Pin 1-2 Close	Pin 1-2-3 Open
SW4-RMII MAC to MAC mode with J6 used	Closed	Close is normal mode (Device's clock source comes from SM4TXC pin 50MHz external reference clock)	Pin 1-2-3 Open	Pin 2-3 Close
SW4-RMII MAC to PHY mode with J7 used	Closed	Close is normal mode (Device's clock source comes from SM4TXC pin 50MHz external reference clock)	Pin 2-3 Close	Pin 1-2-3 Open

Table 9 Configure for SW4-RMII

4.6.4 Port 3 SW3-RMII Jumper Configuration for KSZ8864

Modes	JP42	JP41	JP24	JP27
SW3-RMII MAC to MAC mode with J6 used	Closed	Either Open (clock mode) or Closed (normal mode). Note: When normal mode is used, port 4 SW4-RMII SM4TXC should receive an external 50MHz clock, and then SM3RXC can provides 50MHz clock to SM3TXC and port 3 opposite RMII. Whatever clock or normal mode, the port 3 opposite RMII must receive 50MHz reference clock.	Pin 1-2 Close	Pin 1-2-3 Open
SW3-RMII MAC to PHY mode with J7 used	Closed	Either Open (clock mode) or Closed (normal mode). Note: When normal mode is used, port 4 SW4-RMII SM4TXC should receive an external 50MHz clock, and then SM3RXC can provides 50MHz clock to SM3TXC and port 3 opposite RMII. Whatever clock or normal mode, the port 3 opposite RMII must receive 50MHz reference clock.	Pin 1-2 Close	Pin 1-2-3 Open

Table 10 Configure for SW3-RMII

4.7 MDC/MDIO Interface for MIIM Registers and SMI mode

From MDC/MDIO interface to the KSZ8864, use a USB to MDC/MDIO converter that allows accessing all of PHY related registers and all of the KSZ8864 registers. The user can easily access the MDC/MDIO interface using a computer connected to the evaluation board's USB port interface. Micrel provides Windows 2000/XP based programs for the user to evaluate both MIIM and SMI. For the MIIM software to be used all of PHY related registers, please use the software tool in the

folder of MDC_MDIO MIIM of the software directory. For the SMI software to be used all of the registers, please use the software tool in the folder of MDC_MDIO SMI of the software directory.

To prepare the KSZ8864 evaluation board for MDC/MDIO configuration follow these steps:

1. Copy the Micrel provided software on your computer.
2. Set JP2, JP3 and JP4 as specified in Table below for the MDC/MDIO configuration.

Table 11 MDC/MDIO Settings for MIIM

Jumper	Description	Setting
JP1	EEPROM	Open
JP2	EEPROM/MIIM/SMI	Close
JP3	MDC for MIIM/SMI	Close
JP4	MDIO for MIIM/SMI	Close
JP8	Serial Bus Config. (PS0)	Open
JP9	Serial Bus Config. (PS1)	Open

9. Connect the computer's USB port to the KSZ8864 board with a USB port cable.
10. There are two ways to power up the evaluation board:
    a). Connect the 5 VDC power supply to the KSZ8864 when JP47 pin1-2 is closed.
    b). 5 VDC power source from the USB port when JP47 pin 2-3 is closed.
11. For the SMI interface, PS [1, 0] should be '01', JP8 also should be closed on the board, please see the detail in the Table 12.

Table 12 MDC/MDIO Settings for SMI

Jumper	Description	Setting
JP1	EEPROM	Open
JP2	EEPROM/MIIM/SMI	Close
JP3	MDC for MIIM/SMI	Close
JP4	MDIO for MIIM/SMI	Close
JP8	Serial Bus Config. (PS0)	Close
JP9	Serial Bus Config. (PS1)	Open

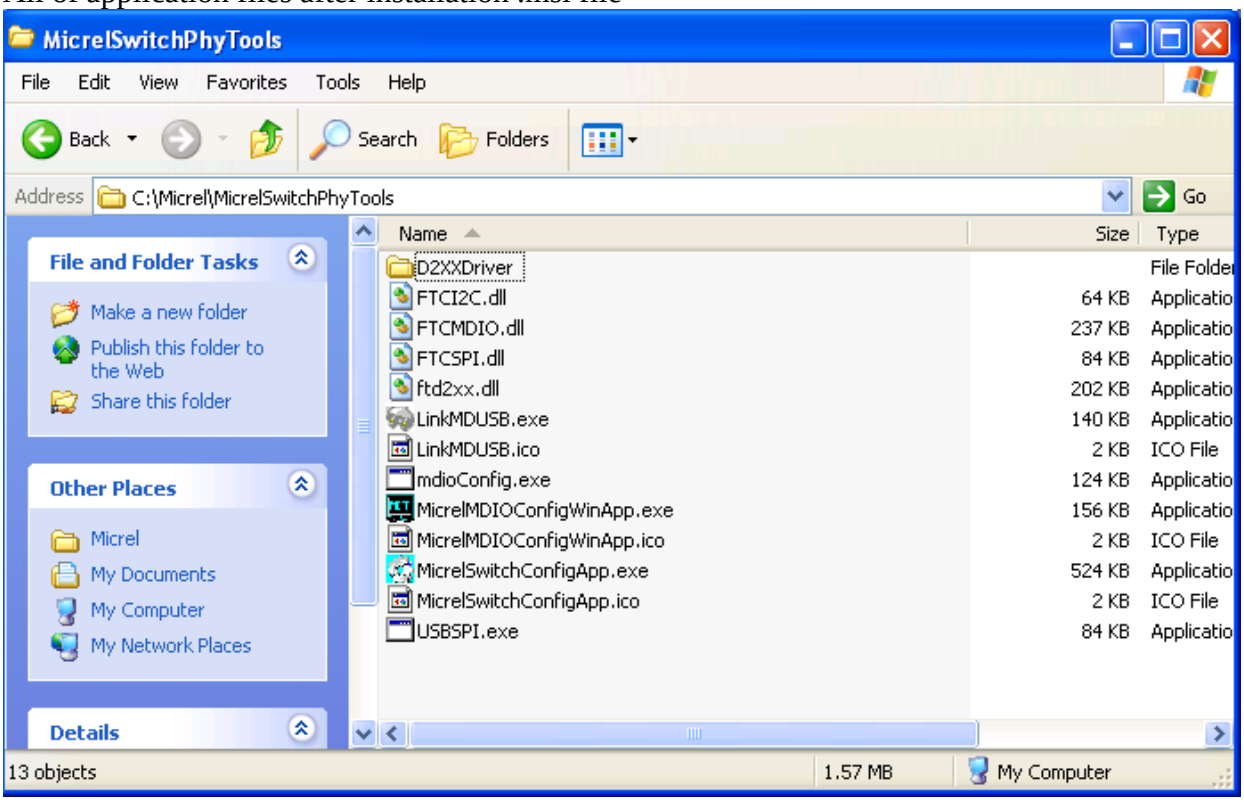
12. Open the Windows and navigate to the directory where the Window MDC/MDIO files are stored. Click its icon to invoke the software.
13. Program the desired settings using the Micrel MDC/MDIO software. See the software operation description section 5.4 and 5.5 for details of MIIM and SMI.

5.0 Software Description

5.1 Introducing Application Software Tools

The Design Kit provides some software tools to support SPI interface, EEPROM (I2C) and MDC/MDIO access for MIIM registers and SMI interface. They are located folders in the software tool directory as follows:

1. In folder of DOS SPI Tool, there is an 8895SPI_DOS.exe file which can be executed directly. The tool is used to access all registers by SPI in a DOS Window.
2. In folder of MDC_MDIO SMI, there is a MicrelSMIIfApp.exe file which can be executed directly by clicking its icon. The software tool is used to access all registers by MDC/MDIO interface with SMI mode.
3. In folder of Window SPI_I2C_MIIM Tools, there is a MicrelSwitchPhyTools_1.xx.msi file which is clicked to create two application files in the default folder of Micrel (or you selected folder) and two icons on desktop, they need window drivers supported first, see 5.2 section for detail. One software tool is used to access all registers by SPI interface or is used to read/write all control register on I2C EEPROM mapping. Another software tool is used to access all MIIM registers for all PHYs.
4. All of application files after installation .msi file



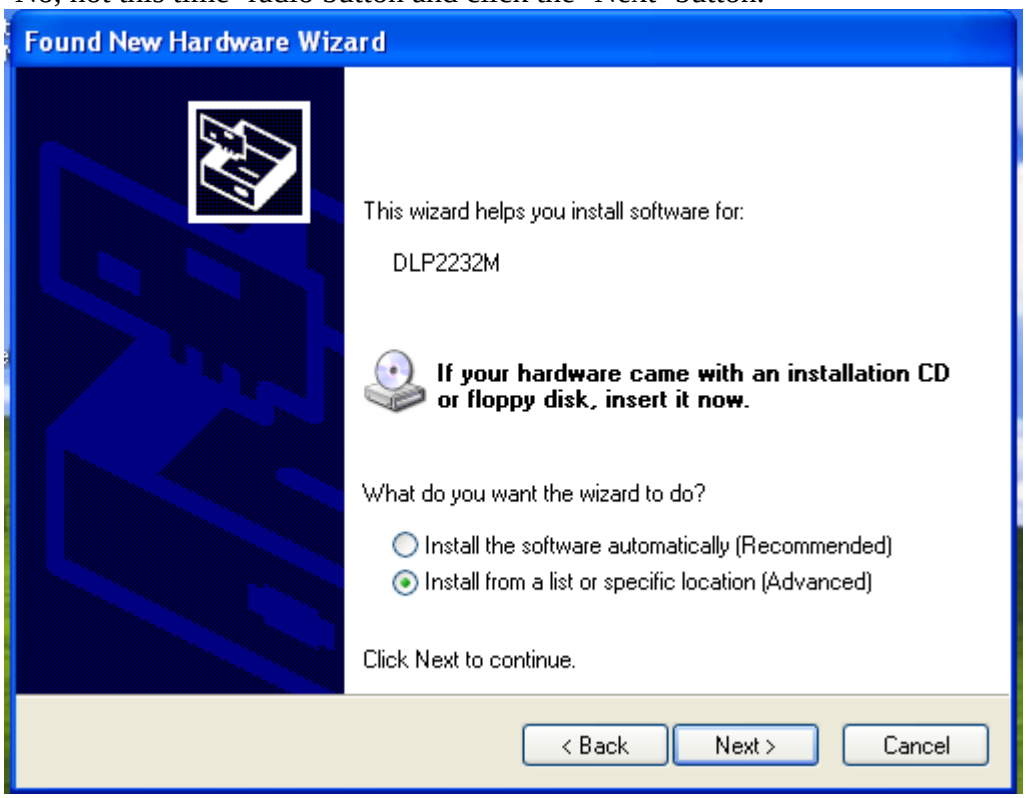
5.2 Install Window Driver First

Before use the Window based application software tool, the support drivers need to be installed to PC/Laptop first and this installation is just one times only. When connect one standard USB cable with type A and type B connectors between the evaluation board and PC computer first time, the

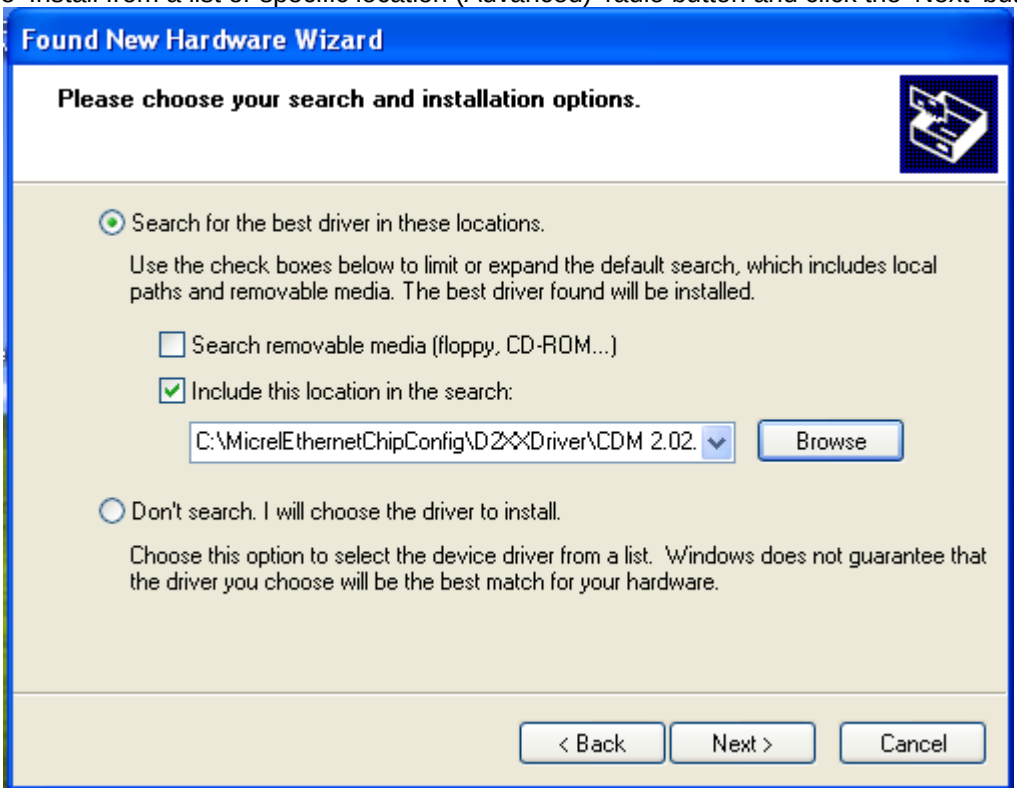
Found New Hardware Wizard window will pop-up and then follow the instructions step by step as below.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

. Choose 'No, not this time' radio button and click the 'Next' button.


Found New Hardware Wizard
This wizard helps you install software for:
DLP2232M
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

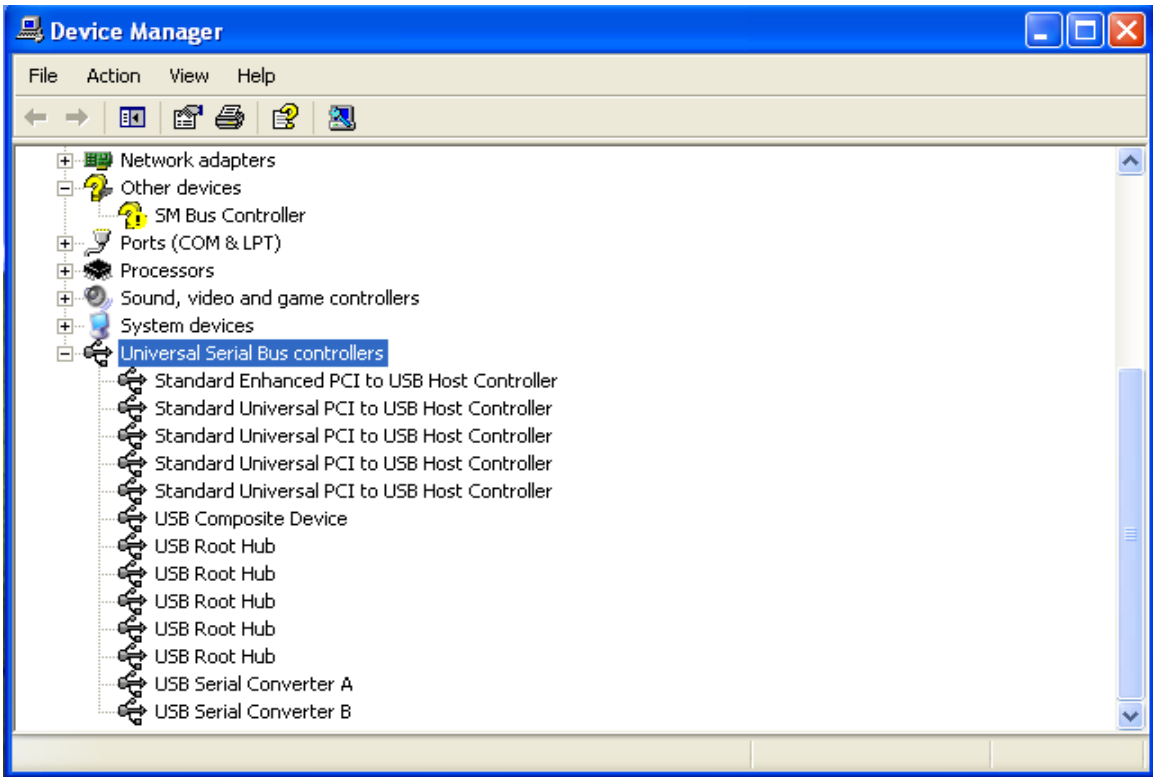
Choose the 'Install from a list or specific location (Advanced)' radio button and click the 'Next' button.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\MicrelEthernetChipConfig\D2XXDriver\CDM 2.02.
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

Click the 'Include this location in the search' check box, and use 'Browse' button to select the 'C:\MicrelEthernetChipConfig\D2XXDriver\CDM 2.02.04 WHQL Certified' directory and click the 'Next' button. The window will install the drivers from this location.

Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
USB Serial Converter A
Click Finish to close the wizard.
< Back
Finish
Cancel

Click 'Finish' button. The Window will install another driver called 'USB Serial Converter B'. After the drivers installed, Window Device Manager will show 'USB Serial Converter A' and 'USB Serial Converter B' as below figure. That means the installation successful.

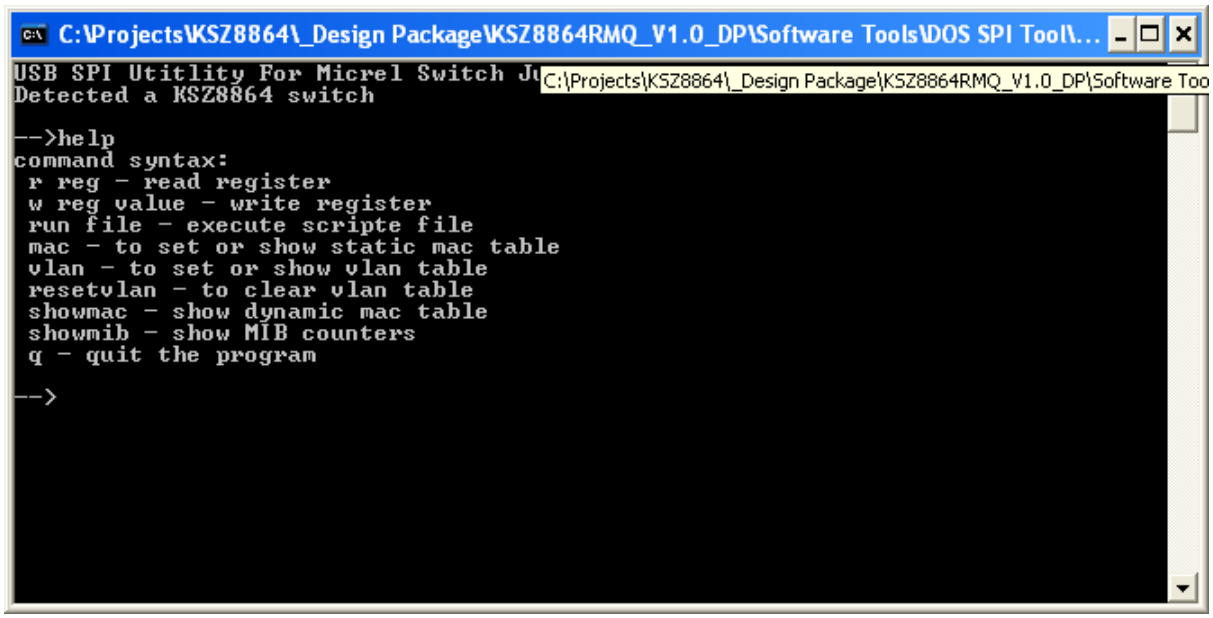


5.3 DOS SPI Tool

This is a simple and powerful tool to access all register. The tool located in the folder of DOS SPI Tool in the Software tools folder. There is an USBSPI.exe file which can be executed directly by clicking its icon (the software tool support 8864 all registers also).

Before run the software tool, the JP9 should be closed, please check the SPI setting in 4.3 SPI mode section. After click its icon, a DOS Window will pop up as follow:

Type a 'help' and press Enter, all commands will display as follows,


C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Tools\DOS SPI Tool\...
USB SPI Utitlity For Micrel Switch Ju
C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Too
Detected a KSZ8864 switch
-->help
command syntax:
r reg - read register
w reg value - write register
run file - execute scripte file
mac - to set or show static mac table
vlan - to set or show vlan table
resetvlan - to clear vlan table
showmac - show dynamic mac table
showmib - show MIB counters
q - quit the program
-->

For Read or Write registers, reg is the offset address of the register, value is Hex number.
The 'run file' command can execute multiple commands by a script file, the script file is a .txt file which can be created by any edit tools.
→ run xxxx.txt //will run the .txt script file.

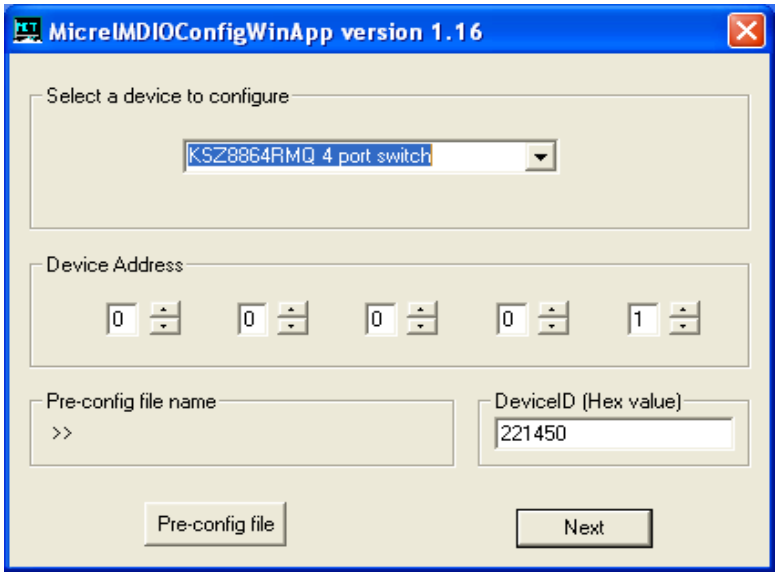
5.4 MDC/MDIO MIIM Software Tool

5.4.1 MDC/MDIO MII software installation

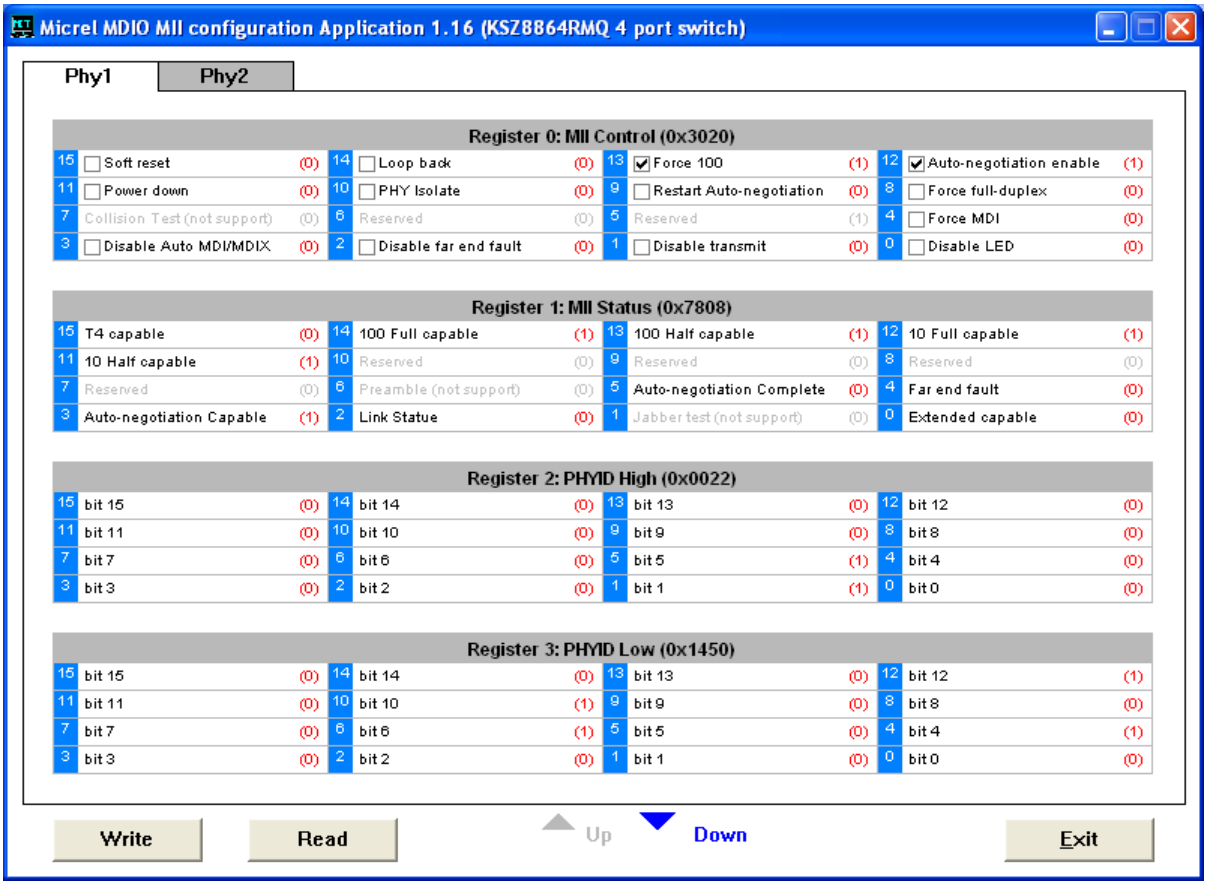
The software tool can be used to access all MIIM registers for PHY based.
This install file of the software tool locates in folder of Window SPI_I2C_MIIM Tools in the software tools folder of the Design Kit, there is MicrelSwitchPhyTools_1.xx.msi file which is clicked to install application file and add two application icons on the desktop, this installation just do one times only, the application file will be copied into the folder of Micrel\MicrelSwitchPhyTools (default) or other assigned folder in the installation.
The MDC/MDIO MIIM Software Tool can be executed directly by clicking its application file or icon with name of MicrelMDIOConfigWinApp on the desktop.

5.4.2 On board jumper setting and Software Application

Before run the software tool, the JP2, JP3 and JP4 should be closed, please check the MDC/MDIO setting in section of 4.7 MIIM SMI mode section. After click its icon, a Window will pop up as follow:



Select 'KSZ8864 4 port switch' and click Next button, Pop up a MDIO MIIM Configuration window as follows:
By this window, all of MIIM registers on 2 PHYs can be read and written directly. Click the mark of Down or Up, all MII registers will display for configuration. Check any writable bits of registers and click Write button, the value of registers will be changed.


Micrel MDIO MII configuration Application 1.16 (KSZ8864RMQ 4 port switch)
Phy1
Phy2
Register 0: MII Control (0x3020)
15 Soft reset (0) 14 Loop back (0) 13 Force 100 (1) 12 Auto-negotiation enable (1)
11 Power down (0) 10 PHY Isolate (0) 9 Restart Auto-negotiation (0) 8 Force full-duplex (0)
7 Collision Test (not support) (0) 6 Reserved (0) 5 Reserved (1) 4 Force MDI (0)
3 Disable Auto MDI/MDIX (0) 2 Disable far end fault (0) 1 Disable transmit (0) 0 Disable LED (0)
Register 1: MII Status (0x7808)
15 T4 capable (0) 14 100 Full capable (1) 13 100 Half capable (1) 12 10 Full capable (1)
11 10 Half capable (1) 10 Reserved (0) 9 Reserved (0) 8 Reserved (0)
7 Reserved (0) 6 Preamble (not support) (0) 5 Auto-negotiation Complete (0) 4 Far end fault (0)
3 Auto-negotiation Capable (1) 2 Link Statue (0) 1 Jabber test (not support) (0) 0 Extended capable (0)
Register 2: PHYID High (0x0022)
15 bit 15 (0) 14 bit 14 (0) 13 bit 13 (0) 12 bit 12 (0)
11 bit 11 (0) 10 bit 10 (0) 9 bit 9 (0) 8 bit 8 (0)
7 bit 7 (0) 6 bit 6 (0) 5 bit 5 (1) 4 bit 4 (0)
3 bit 3 (0) 2 bit 2 (0) 1 bit 1 (1) 0 bit 0 (0)
Register 3: PHYID Low (0x1450)
15 bit 15 (0) 14 bit 14 (0) 13 bit 13 (0) 12 bit 12 (1)
11 bit 11 (0) 10 bit 10 (1) 9 bit 9 (0) 8 bit 8 (0)
7 bit 7 (0) 6 bit 6 (1) 5 bit 5 (0) 4 bit 4 (1)
3 bit 3 (0) 2 bit 2 (0) 1 bit 1 (0) 0 bit 0 (0)
Write
Read
Up
Down
Exit

5.5 MDC/MDIO SMI Software Tool

5.5.1 MDC/MDIO SMI software

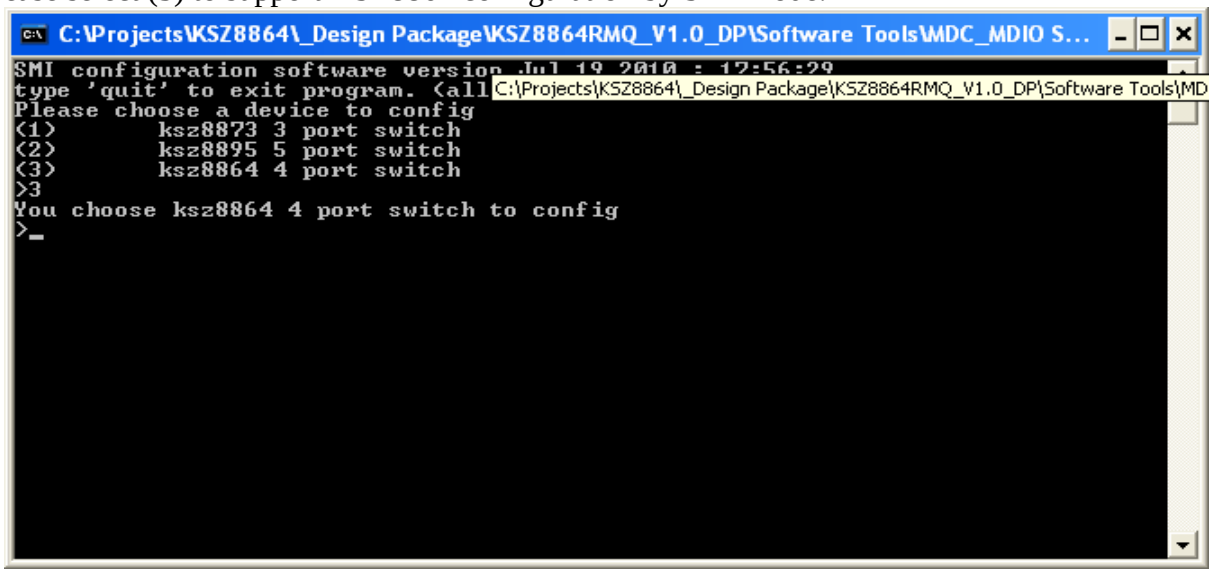
The software tool can be used to access all registers of KSZ8864 by MDC/MDIO interface. This tool locate in folder of MDC_MDIO SMI in the Design Kit, there is MicrelSMIIfApp.exe file which can be executed directly by clicking its icon.

5.5.2 On board jumper setting and Software Application

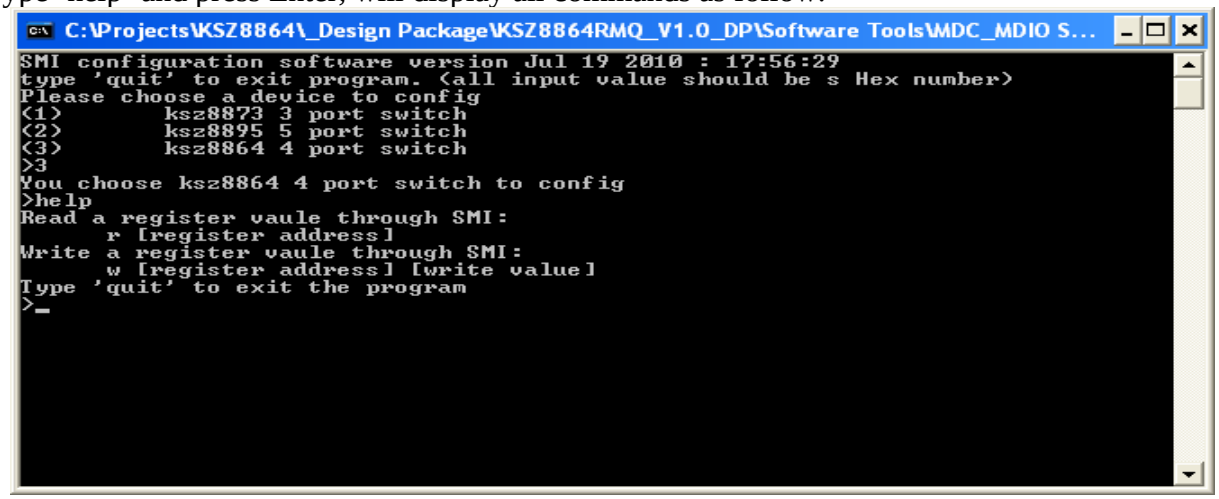
Before run the software tool, the JP2, JP3 and JP4 should be closed, please check the MDC/MDIO setting in section of 4.7 MIIM SMI mode and pins PS[1:0]=01, JP8 should be closed also. After click its icon, a Window will pop up as follow:
There are two options:

(1) KSZ8873 3 port switch
(2) KSZ8895 5-port switch
(3) KSZ8864 4-port switch

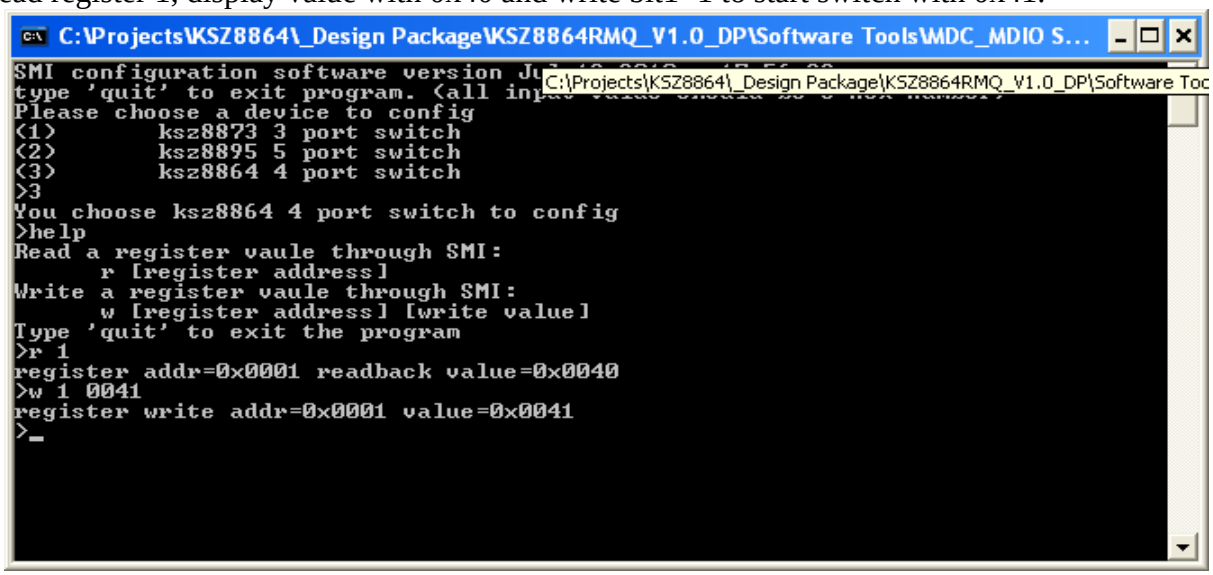
Please select (3) to support KSZ8864 configuration by SMI mode.


C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Tools\MDC_MDIO S...
SMI configuration software version Jul 19 2010 : 12:56:29
type 'quit' to exit program. (all
C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Tools\MD
Please choose a device to config
(1) ksz8873 3 port switch
(2) ksz8895 5 port switch
(3) ksz8864 4 port switch
>3
You choose ksz8864 4 port switch to config
>_

Type 'help' and press Enter, will display all commands as follow.


C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Tools\MDC_MDIO S...
SMI configuration software version Jul 19 2010 : 17:56:29
type 'quit' to exit program. (all input value should be s Hex number)
Please choose a device to config
(1) ksz8873 3 port switch
(2) ksz8895 5 port switch
(3) ksz8864 4 port switch
>3
You choose ksz8864 4 port switch to config
>help
Read a register vaule through SMI:
r [register address]
Write a register vaule through SMI:
w [register address] [write value]
Type 'quit' to exit the program
>_

Read register 1, display value with 0x40 and write bit1=1 to start switch with 0x41.


C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Tools\MDC_MDIO S...
C:\Projects\KSZ8864_Design Package\KSZ8864RMQ_V1.0_DP\Software Toc
SMI configuration software version
type 'quit' to exit program.
Please choose a device to config
(1) ksz8873 3 port switch
(2) ksz8895 5 port switch
(3) ksz8864 4 port switch
>3
You choose ksz8864 4 port switch to config
>help
Read a register vaule through SMI:
r [register address]
Write a register vaule through SMI:
w [register address] [write value]
Type 'quit' to exit the program
>r 1
register addr=0x0001 readback value=0x0040
>w 1 0041
register write addr=0x0001 value=0x0041
>_

5.6 EEPROM Software Tool

5.6.1 EEPROM software installation

Micrel provides EEPROM software tool can use a PC/Laptop via the on board USB port to program the KSZ8864 evaluation board's EEPROM without the added expense of an external EEPROM programmer.

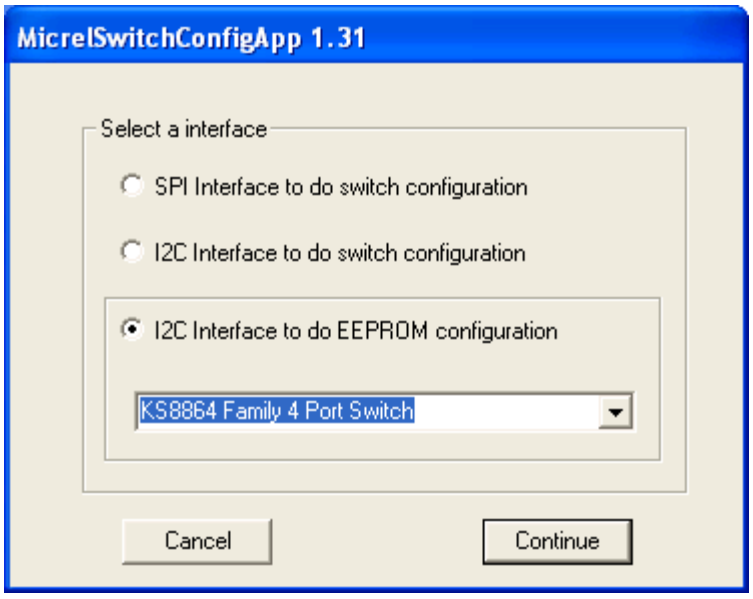
The software tool can be used to read/write all control registers of the KSZ8864.

The installation file of the tool is located in folder of Window SPI_I2C_MIIM Tools in the software tools folder of the Design Kit, there is MicrelSwitchPhyTools_1.xx.msi file which is clicked to install application file and add two application icons on the desktop, this installation just do one times only, the application file will be copied into the folder of Micrel\MicrelSwitchPhyTools (default) or other assigned folder in the installation.

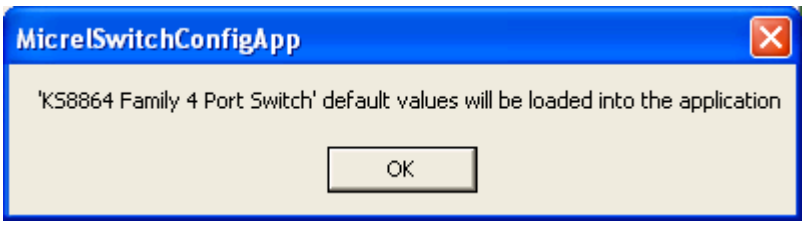
The MDC/MDIO EEPROM Software Tool can be executed directly by clicking its application file or icon with name of MicrelSwitchConfigApp on the desktop.

5.6.2 On board jumper setting and Software Application

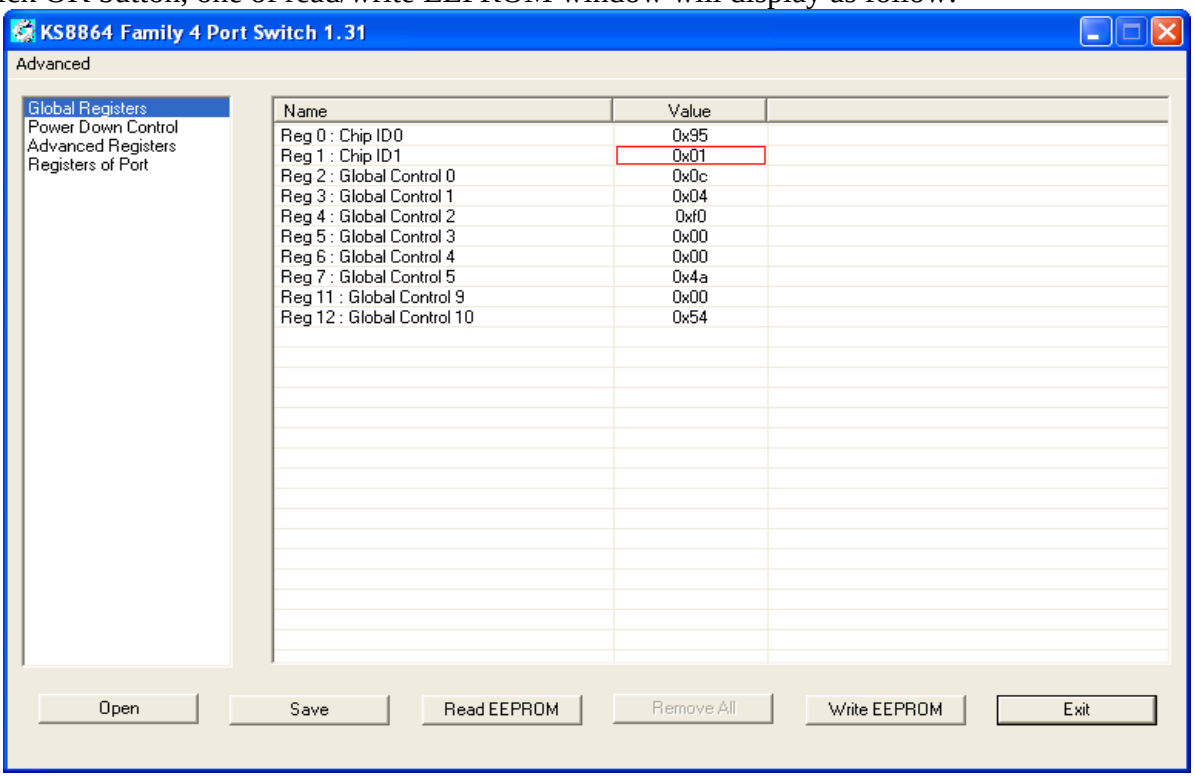
Before run the software tool, the JP1 and JP2 should be closed, please check the EEPROM setting in section of 4.2 EEPROM mode. After click its icon, a Window will pop up as follow:



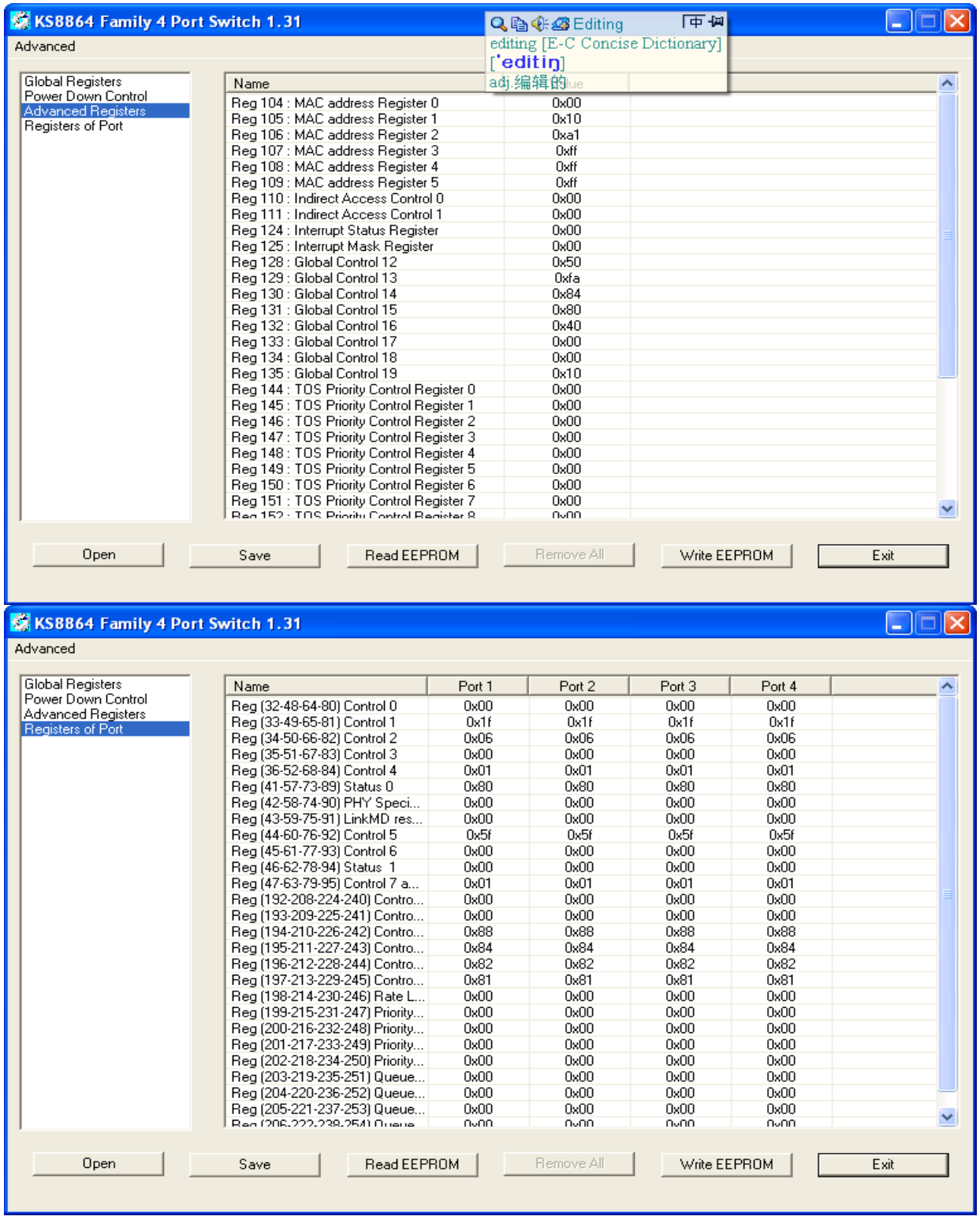
Select the radio of I2C interface to do EEPROM configuration and press Continue button, pop up a window as follow.



Click OK button, one of read/write EEPROM window will display as follow:


KS8864 Family 4 Port Switch 1.31
Advanced
Global Registers
Power Down Control
Advanced Registers
Registers of Port
Name
Value
Reg 0 : Chip ID0 0x95
Reg 1 : Chip ID1 0x01
Reg 2 : Global Control 0 0x0c
Reg 3 : Global Control 1 0x04
Reg 4 : Global Control 2 0xf0
Reg 5 : Global Control 3 0x00
Reg 6 : Global Control 4 0x00
Reg 7 : Global Control 5 0x4a
Reg 11 : Global Control 9 0x00
Reg 12 : Global Control 10 0x54
Open
Save
Read EEPROM
Remove All
Write EEPROM
Exit

Note: Chip ID1 has to set to 0x00 or 0x01 for EEPROM contents to be downloaded to all registers in current device revision.
The software tool can read/write all advanced and port control registers as followed pop-up Windows.


KS8864 Family 4 Port Switch 1.31
Advanced
Global Registers
Power Down Control
Advanced Registers
Registers of Port
Name
Reg 104 : MAC address Register 0 0x00
Reg 105 : MAC address Register 1 0x10
Reg 106 : MAC address Register 2 0xa1
Reg 107 : MAC address Register 3 0xff
Reg 108 : MAC address Register 4 0xff
Reg 109 : MAC address Register 5 0xff
Reg 110 : Indirect Access Control 0 0x00
Reg 111 : Indirect Access Control 1 0x00
Reg 124 : Interrupt Status Register 0x00
Reg 125 : Interrupt Mask Register 0x00
Reg 128 : Global Control 12 0x50
Reg 129 : Global Control 13 0xfa
Reg 130 : Global Control 14 0x84
Reg 131 : Global Control 15 0x80
Reg 132 : Global Control 16 0x40
Reg 133 : Global Control 17 0x00
Reg 134 : Global Control 18 0x00
Reg 135 : Global Control 19 0x10
Reg 144 : TOS Priority Control Register 0 0x00
Reg 145 : TOS Priority Control Register 1 0x00
Reg 146 : TOS Priority Control Register 2 0x00
Reg 147 : TOS Priority Control Register 3 0x00
Reg 148 : TOS Priority Control Register 4 0x00
Reg 149 : TOS Priority Control Register 5 0x00
Reg 150 : TOS Priority Control Register 6 0x00
Reg 151 : TOS Priority Control Register 7 0x00
Open
Save
Read EEPROM
Remove All
Write EEPROM
Exit
KS8864 Family 4 Port Switch 1.31
Advanced
Global Registers
Power Down Control
Advanced Registers
Registers of Port
Name
Port 1
Port 2
Port 3
Port 4
Reg (32-48-64-80) Control 0 0x00 0x00 0x00 0x00
Reg (33-49-65-81) Control 1 0x1f 0x1f 0x1f 0x1f
Reg (34-50-66-82) Control 2 0x06 0x06 0x06 0x06
Reg (35-51-67-83) Control 3 0x00 0x00 0x00 0x00
Reg (36-52-68-84) Control 4 0x01 0x01 0x01 0x01
Reg (41-57-73-89) Status 0 0x80 0x80 0x80 0x80
Reg (42-58-74-90) PHY Speci... 0x00 0x00 0x00 0x00
Reg (43-59-75-91) LinkMD res... 0x00 0x00 0x00 0x00
Reg (44-60-76-92) Control 5 0x5f 0x5f 0x5f 0x5f
Reg (45-61-77-93) Control 6 0x00 0x00 0x00 0x00
Reg (46-62-78-94) Status 1 0x00 0x00 0x00 0x00
Reg (47-63-79-95) Control 7 a... 0x01 0x01 0x01 0x01
Reg (192-208-224-240) Contro... 0x00 0x00 0x00 0x00
Reg (193-209-225-241) Contro... 0x00 0x00 0x00 0x00
Reg (194-210-226-242) Contro... 0x88 0x88 0x88 0x88
Reg (195-211-227-243) Contro... 0x84 0x84 0x84 0x84
Reg (196-212-228-244) Contro... 0x82 0x82 0x82 0x82
Reg (197-213-229-245) Contro... 0x81 0x81 0x81 0x81
Reg (198-214-230-246) Rate L... 0x00 0x00 0x00 0x00
Reg (199-215-231-247) Priority... 0x00 0x00 0x00 0x00
Reg (200-216-232-248) Priority... 0x00 0x00 0x00 0x00
Reg (201-217-233-249) Priority... 0x00 0x00 0x00 0x00
Reg (202-218-234-250) Priority... 0x00 0x00 0x00 0x00
Reg (203-219-235-251) Queue... 0x00 0x00 0x00 0x00
Reg (204-220-236-252) Queue... 0x00 0x00 0x00 0x00
Reg (205-221-237-253) Queue... 0x00 0x00 0x00 0x00
Open
Save
Read EEPROM
Remove All
Write EEPROM
Exit

After change the bits of the registers, the change can be written to EEPROM and save to a file for a back-up.

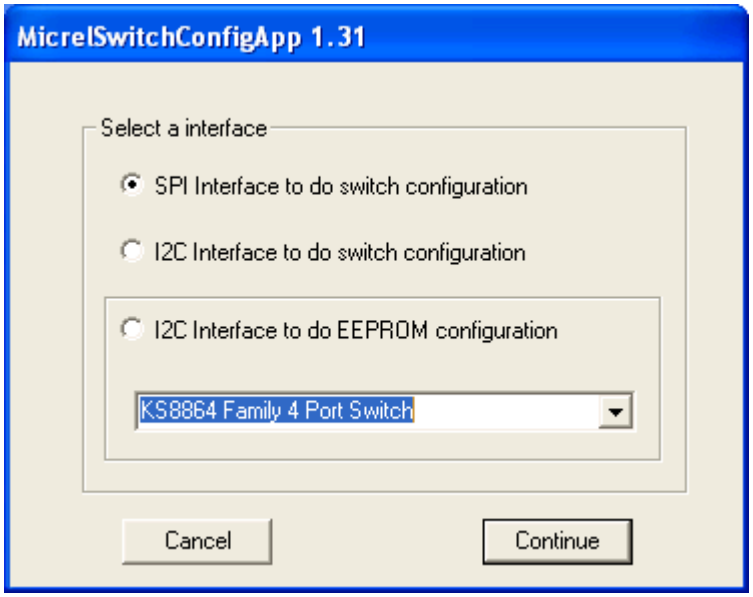
5.7 Window SPI Software Tool

5.7.1 Window SPI software installation

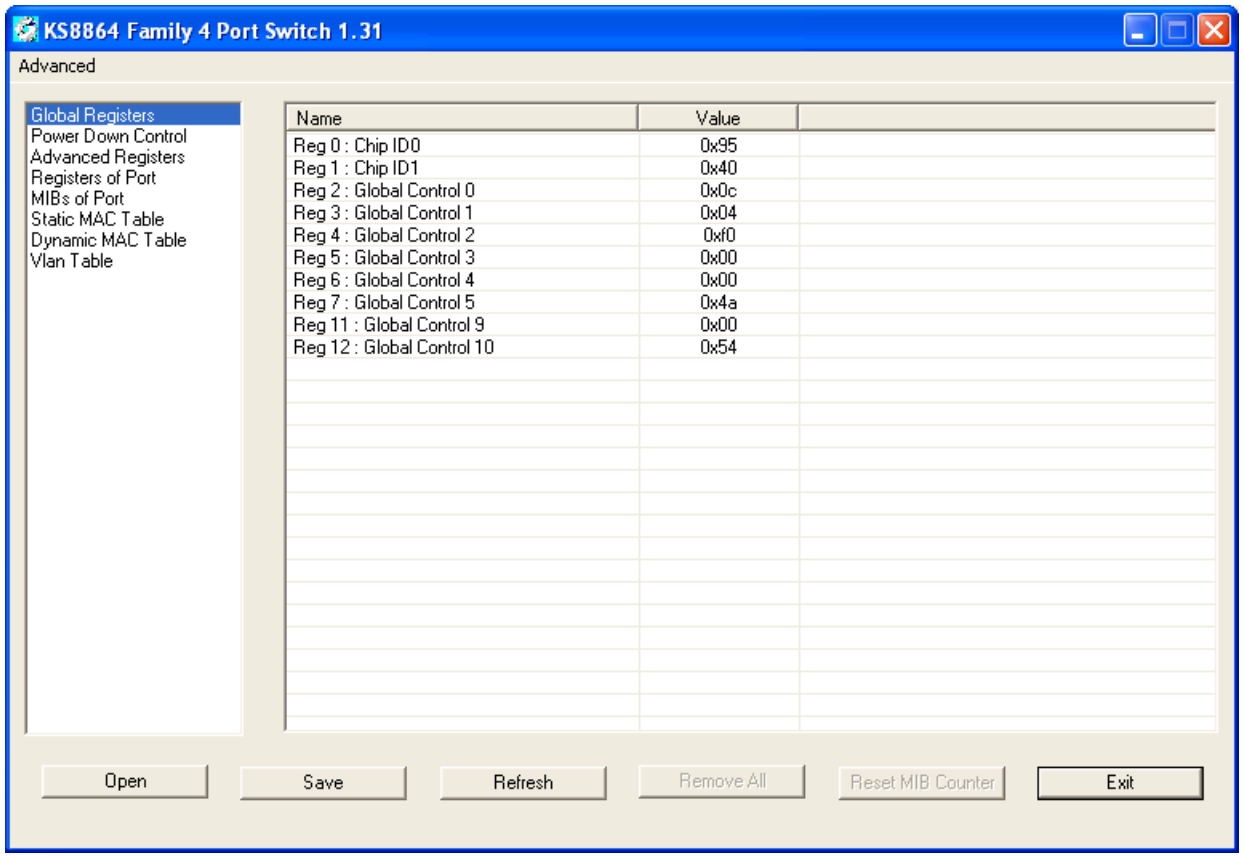
The software tool can be used to read/write all of registers of the KSZ8864.
The installation file of the tool is located in folder of Window SPI_I2C_MIIM Tools in the software tools folder of the Design Kit, there is MicrelSwitchPhyTools_1.xx.msi file which is clicked to install application file and add two application icons on the desktop, this installation just do one times only, the application file will be copied into the folder of Micrel\MicrelSwitchPhyTools (default) or other assigned folder in the installation.
The MDC/MDIO SPI Software Tool can be executed directly by clicking its application file or icon with name of MicrelSwitchConfigApp on the desktop.

5.7.2 On board jumper setting and Software Application

Before run the software tool, the JP9 should be closed, please check the SPI setting in section of 4.3 SPI mode. After click its icon, a control Window will be pop up as follow:



The default is SPI interface to do switch configuration. From the device selection window to select KSZ8864 device or/and press Continue button directly. A control window will be pop up as follow.
The software tools also can do Auto detection and select a correct device function.
All register can be read and written in the window.



The control Window includes all registers, static MAC table, LAN table, dynamic table and MIB counter that are supported by SPI. The software can save and open the configuration file.

6.0 Reference Documents

KSZ8864 Data Sheet (Contact Micrel for Latest Datasheet), KSZ8864 Design Package includes all design information as a Design Kit (Contact Micrel for the updates).

7.0 Bill of Material

Please see the detail BOM in the BOM folder of the hardware design package in the design kit for the KSZ8864 Evaluation Board.

8.0 Magnetic Vendors

See datasheet for the recommendation.

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